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⑥ AN EVALUATION OF THE BIRD/AIRCRAFT  
STRIKE HAZARD,  
MALMSTROM AFB, MT.

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LARRY J. CLARK Capt, USAF

RICHARD D. SMEDLEY JR., AMM, USAF

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PREFACE

This study was conducted under Program Element 91212F,  
AFCEC JON 00DEVN11. Inclusive dates of the study were 26  
August-2 September 1977.

This memorandum has been reviewed and is approved.

*Michael J. Harrison*

MICHAEL J. HARRISON, Capt, USAF  
Chief, Natural Resources  
Division

*Sterling E. Schultz*

STERLING E. SCHULTZ, Lt Col, USAF  
Director of Environmental  
Planning

*Robert M. Iten*  
ROBERT M. ITEN, Colonel, USAF  
Commander

## ABSTRACT

The bird/aircraft strike hazard (BASH) at Malmstrom Air Force Base, Montana, was surveyed during the period 26 August-2 September 1977. Special emphasis was placed on local gull activities which contribute significantly to the bird strike potential. Recommendations aimed at reducing the airfield bird strike potential are part of this report.

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## SUMMARY OF OBSERVATIONS AND RECOMMENDATIONS

1. There is a definite bird/aircraft strike hazard at Malmstrom AFB because of the following factors:

a. Birds, such as gulls and waterfowl, overfly the airfield during the migrating seasons. Large flocks of gulls are reportedly using the airfield for loafing during the fall migratory season.

b. The greatest risk to aircraft occurs during takeoff and landing since gull flocks frequenting the airfield in late summer normally fly below 500 feet AGL.

c. Migratory birds fly along the Missouri River and create a potentially serious hazard to aircraft approaching Runways 02 and 20.

d. Jackrabbits are presenting a serious airfield hazard because:

(1) They are an excellent food source for raptors (birds of prey) and,

(2) They present a hazard to aircraft during landing and takeoff rolls.

2. Recommendations.

a. A bird hazard working group should be formed to prepare a plan for bird control or avoidance.

b. A BIRD WATCH should be implemented to alert aircrews to possible flight hazards due to increased bird activity.

c. The M-74 Airburst, which is fired from the M-1 Pyrotechnic Pistol, should be procured and used to disperse birds from the airfield.

d. Bird control personnel should have a uniquely marked vehicle so that birds will eventually associate the vehicle with danger.

e. A comprehensive insect control program for the airfield should be initiated to reduce the availability of food for gulls and swallows.

f. Aircraft departing Malmstrom AFB should execute maximum performance climbs to 3000 feet AGL to insure minimum exposure to the majority of birds.

g. Aircraft cleared for takeoff should be advised of observed bird activity by tower personnel.

h. Controlled jackrabbit hunting should be allowed when jackrabbit populations reach hazardous levels.

These observations and recommendations are addressed in greater detail in the body of this report.

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## SECTION I

### INTRODUCTION

Malmstrom Air Force Base is located 3 kilometers northeast of Great Falls, Montana. The base is situated atop a plateau with an airfield elevation of 1074 meters mean sea level (MSL). The surrounding area has lower elevations. The Missouri River is located 6.4 kilometers north of the base.

The existing vegetation on base includes lawn grasses and herbaceous species native to the short grass prairie. One plant present which attracts seed-eating birds and small mammals is the sunflower (*Helianthus*). A cottonwood (*Populus sargentii*) grove is located along both sides of the abandoned R/W "R," approximately 366 meters from the active runway (02/20).

A small pond surrounded by willow (*Salix*), rushes (*Juncus*), and cattail (*Typha*) is located in Pow Wow Park, approximately 366 meters east of the active runway.

In addition, there are low areas which either maintain standing water or contain water only after heavy rains. These habitats provide food, water, or cover for a number of avian species, some of which are hazardous to aircraft.

This bird/aircraft strike hazard survey was conducted from 25 August to 2 September 1977 at the request of Strategic Air Command (SAC). Local ecology, bird activity, land use, and operational procedures were studied to identify situations contributing to the bird strike potential at Malmstrom AFB.

This report includes a list of observations and recommendations to assist the base in reducing the bird strike potential. These recommendations require the commitment of a number of organizations on the base. The focal point for establishing priorities and coordinating recommended actions should be the Bird Hazard Working Group. Overall responsibility for the program should rest with the Chief of Airfield Management. Bird strike hazard reduction requires a continuing program.

## SECTION II

### OBSERVATIONS AND RECOMMENDATIONS

#### 1. OPERATIONAL CHANGES AND BIRD WATCH

To reduce bird hazards to aircraft, base bird populations can be managed by changing the habitat and controlling the population. However, no program can completely eliminate all birds. Birds such as gulls and waterfowl will overfly the field during migratory periods. Gulls (*Larus sp.*), Western Meadowlarks (*Sturnella neglecta*), and Horned Larks (*Eremophila alpestris*) may be found on the airfield in large flocks. Temporary operational changes may be needed to reduce the bird strike potential until the birds pass or are dispersed from the field.

#### Recommendations

a. A Bird Hazard Working Group should be formed to prepare a plan for bird control or avoidance. Flying Safety, Civil Engineering, Flight Facilities, and Airfield Management should be represented. This group will implement a plan, develop procedures, and delineate responsibilities for bird control (see Appendix A). The group will also notify and inform pilots about bird hazards and coordinate operational changes designed to reduce the bird strike potential. The group should meet on a regular basis and may function as a portion of the base's Air Traffic Control Board.

b. Once operational procedures have been developed, they should be published as a portion of the plan and in Malmstrom AFB Manual 55-1 to insure compliance by local aircrews.

c. To assist in informing pilots of bird densities which require temporary changes in operations, it is recommended that the term "BIRD WATCH" be used. Similar to a MET WATCH for weather, BIRD WATCH alerts the aircrew to a possible hazard to flight due to increased bird activity. Declaration of BIRD WATCH will depend on what operational changes for bird avoidance are recommended by the Bird Hazard Working Group. The supervisor of flying, tower personnel, or aircrews should notify the Chief of Airfield Management who then declares a BIRD WATCH condition and implements procedures to reduce the risk of bird strikes.

d. BIRD WATCH conditions should be relayed to aircrews through radio communication between air traffic control personnel and the aircraft. The use of Notices to Airmen (NOTAMS) should be encouraged for severe situations which may affect air safety for several days or longer. An example would be the arrival of large flocks of gulls which frequent the airfield daily in late summer. The NOTAM would remain in effect until the birds migrate south.

## 2. GULLS

Up to 2500 gulls (*L. delawarensis* and *L. pipixcan*) were observed on the Missouri River within 3 miles of the base. Although not observed during this survey, large flocks of gulls reportedly feed or loaf on the airfield during late summer. Large gull movements were, however, observed over and around the base (see Figure 1). Overflights of the base were observed in mid-morning while flights along the Missouri River and the Great Fall sanitary landfill were seen during all hours of daylight. According to base personnel these birds arrive each year in late August or early September, spending approximately 3 weeks loafing about on the runways and taxiways before migrating south for the winter. During this period the gulls present a serious hazard to arriving and departing aircraft. Although both the base sanitary landfill and airfield hay cutting activities--which expose large insect food sources and create attractive loafing habitat--are gull attractants, base personnel (Reference 1) indicate that the arrival of the gulls is more related to the arrival of colder weather.

### Recommendations

a. The planned closure of the base sanitary landfill on 1 October 1977 will eliminate some of the base's attractiveness to gulls by reducing the on-base food supply.

b. When large flocks of gulls are observed on the airfield, Base Operations personnel should declare a condition BIRD WATCH with appropriate procedures as established by the Bird Hazard Working Group. Base Operations should also be responsible for dispersing the birds. Dispersal can be accomplished by using shotguns with light field loads and shellcrackers. A more satisfactory dispersal device is the M-74 Airburst which is fired from the M-1 pyrotechnic pistol. Both are successful in dispersing and controlling the direction of flight of flocks of birds on the airfield. Because the gull problem at Malmstrom AFB occurs during a short period each year, these techniques are the most cost effective means of dealing with the problem.

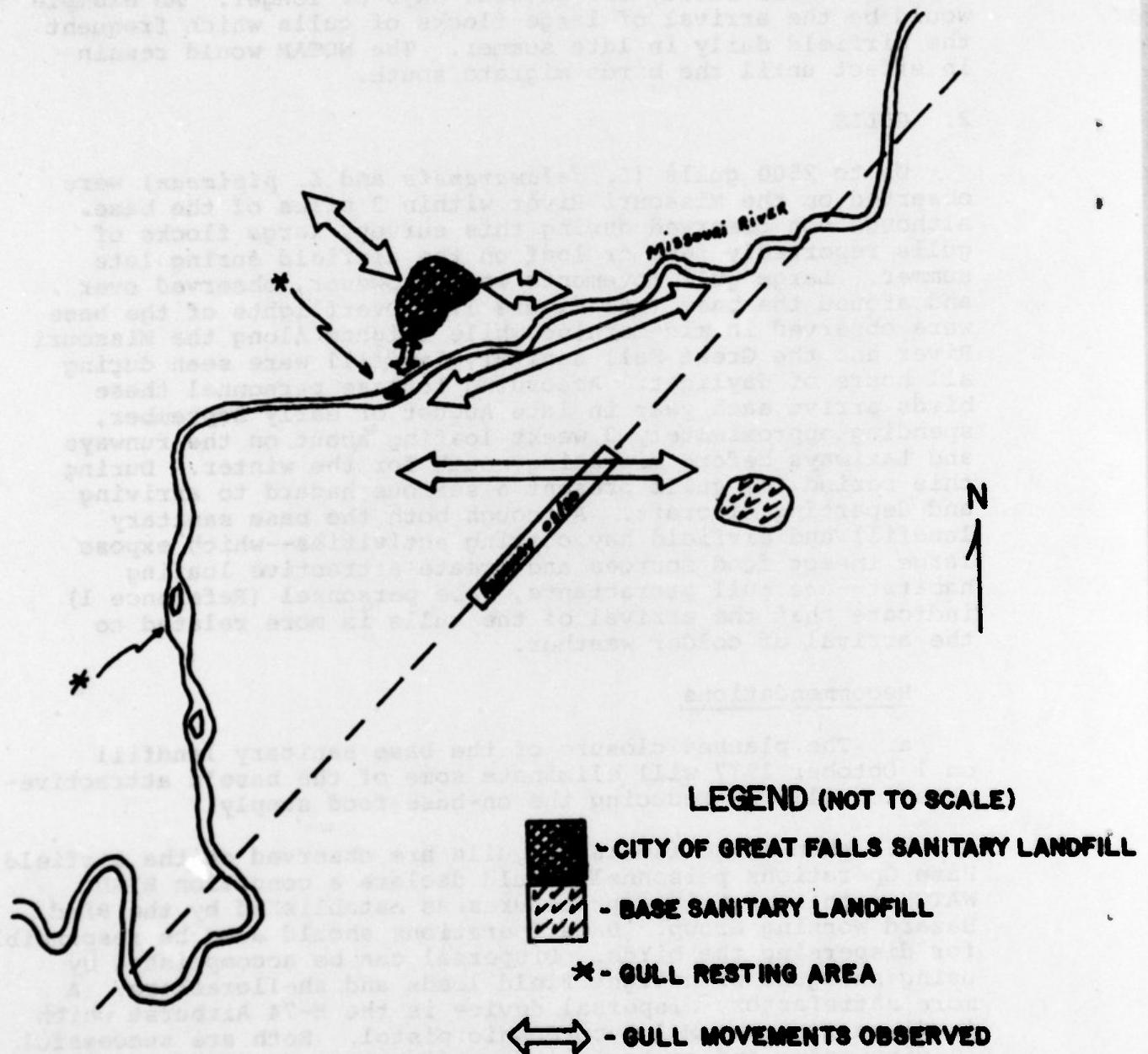


Figure 1. Gull Movements in the Malmstrom AFB Area

The shellcracker costs about \$0.30/round but is less desirable because of its smaller explosive charge and limited reliability. The shellcracker is fired from a 12-gauge shotgun, sending a projectile approximately 100 meters before it explodes with a sharp noise and flash of light. Shellcrackers have been known to explode in the barrel or just after leaving the barrel; therefore, operators should wear gloves, eye protectors, and ear protectors. Use of a modified or open-choke gun reduces the hazard of barrel explosions. No military specifications exist for the shellcrackers; therefore, problems have been encountered in purchasing and storing these shellcrackers. Safety and availability of the M-74 Airburst (FSN: 1370-028-6007) will make it the pyrotechnic of choice. The Airburst is also louder, has a better range, and is much more effective against most birds. Special authorization can be secured from the MAJCOM for use in bird control. The pyrotechnic pistol is also an equipment item probably already on hand.

Bird control personnel should have a uniquely marked vehicle so that birds will eventually associate the vehicle with danger. Bird control contractors at USAF installations in the United Kingdom stated that the birds soon flee at the sight of the control vehicle, thus saving dispersal resources.

When using airbursts, shellcrackers, or live ammunition, the operator should position himself between the runway and the birds or opposite the desired direction of dispersal, firing toward the birds. The airburst should detonate above a flock on the ground or in such a position to drive flying birds in a desired direction. Firing of pyrotechnics should be coordinated with the tower to avoid scaring birds into the path of an approaching or departing aircraft. Firing in close proximity to aircraft should be avoided. Due to security requirements at Malmstrom AFB, a notification checklist should be developed to insure rapid coordination of all pyrotechnic dispersal operations.

c. If harassment is not successful, depredation may be required. Any killing of gulls requires a federal permit.

d. Gulls may also be dispersed by using Avitrol. This is EPA-registered for bird control and should be applied by certified pest control personnel from the base Entomology shop. Application procedures must be strictly followed. This will insure desired results and minimize hazards to non-target species.

e. While base personnel feel that airfield haying operations do not influence the arrival or departure of the gulls, the BASH Team believes that the short grass left after mowing and the large numbers of insects on the airfield may influence their behavior while on the airfield. Because gulls like the good visibility of short grass, runways, and taxiways and the abundant food supply of insects (Reference 3) they may be harder to disperse. The grass could be left tall until after the gulls leave for the winter; however, this would decrease its value as hay. Here, the base must weigh the desirability of contract hay cutting profits versus the increased aircREW safety of an airfield that is less attractive to gulls. In any case, that portion of the airfield mowed by base civil engineering personnel should be maintained at a height of 20 to 30 centimeters during August and September. This could be accomplished by mowing to 12 to 15 centimeters in mid-July and then not mowing again until after the gulls leave in the fall.

f. Airfield attractiveness to gulls could also be lessened by a reduction of the insect food source. This could be accomplished by a comprehensive program for control of flying and ground-dwelling insects. Efforts should include fogging to kill flying insects and spraying for such ground-dwelling forms as grasshoppers. Malathion could be used for both; however, Sevin may be more effective against grasshoppers. Although fogging may be required through the warm seasons for mosquito control, the program described here for reducing bird populations should begin in early August with spraying of the airdrome and associated clear zones. Depending on weather conditions, another spraying may be needed in early September. Fogging should accompany spraying and the combination of the two will effectively reduce insects which attract both gulls and swallows.

It should be emphasized that all pesticide applications must be accomplished as discussed in the label instructions and must be applied by certified personnel according to EPA requirements.

### 3. BIRD AVOIDANCE DURING DEPARTURE

Most birds that fly over and around the airfield rarely exceed altitudes of 914 meters. The flocks of gulls that frequent the airfield in late summer normally fly below 152 meters. The greatest risk to aircraft operating on and around Malmstrom AFB occurs during takeoff and landing. Bird strikes on takeoff are more hazardous than bird strikes on landing

because of greater aircraft gross weight and high power settings during takeoff and departure climb. Engine ingestions of even such small birds as Horned Larks have caused losses of aircraft. A T-38 aircraft at Randolph AFB (Reference 3) was lost due to engine ingestion of Brown-headed Cowbirds (*Malothrus ater*).

#### Recommendations

- a. Aircraft departing Malmstrom AFB should execute maximum performance climbs to an altitude of 3000 feet AGL to insure minimum exposure to the vast majority of birds on the airfield. Aircraft should also avoid flying over the Missouri River before reaching an altitude of 3000 feet AGL.
- b. Aircraft cleared for takeoff should be advised of observed bird activity by tower personnel. The aircraft commander may elect to hold his position until the birds have crossed or have been dispersed from the runway. A pilot would not launch his aircraft into a thunderstorm; a flock of birds should also be reason to delay departure. A 1 or 2-minute delay could save an aircraft from a serious bird strike.
- c. During periods of extremely high bird densities on the airdrome, nonessential flights should be delayed until the birds have been dispersed or have disappeared.

#### 4. BIRD AVOIDANCE DURING ARRIVAL

Arriving aircraft which execute published approaches to Runways 02 and 20 are vulnerable to birds from the final approach inbound. Approaches to both runways take aircraft over the Missouri River at altitudes of less than 1600 feet AGL. Flocks of gulls and waterfowl fly along the river, especially during the migratory seasons of September to November and March to May, and may create a serious hazard to aircraft.

#### Recommendations

- a. Arrival aircraft should watch for birds, especially in the vicinity of the Missouri River. Air Traffic controllers should inform pilots of bird hazards on the airfield. Large flocks of gulls on or over the airfield may necessitate execution of missed approach procedures.
- b. When large flocks of birds are crossing over the approach corridor or resting on the field, arriving aircraft

may be instructed to hold on a published holding pattern until the birds pass or are dispersed from the field. Holding should be executed at an altitude of at least 3000 feet AGL.

c. Procedures should be developed for delaying arrivals when deemed necessary by the Chief of Airfield Management. These procedures will be vital late each summer when the large flocks of gulls arrive on the base prior to migration.

## 5. JACKRABBITS

A large resident population of Whitetail Jackrabbits (*Lepus townsendi*) was observed on Malmstrom AFB. Because of its size and large numbers on the airfield, the Whitetail Jackrabbit represents a serious hazard to aircraft. The presence of jackrabbits on the airdrome is hazardous for two reasons. First, jackrabbits are excellent food sources for birds of prey and will attract these large birds to the airfield, increasing the bird strike potential. Secondly, the jackrabbits were observed crossing the runway on numerous occasions. If the jackrabbits were struck by an aircraft during takeoff or landing, the results could be disastrous. Aircraft collisions with European hares (similar in size and behavior to jackrabbits) substantiated the need for concern. In one instance, a T-39 struck a hare during landing, causing nose gear failure (Reference 2).

### Recommendations

a. Although the base hasn't experienced any damaging jackrabbit strikes, some sort of population control should be initiated. Controlled hunting is probably the best method of diminishing the number of jackrabbits on the airfield. Whenever base rabbit populations reach hazardous levels, a special weekend hunt should be scheduled. The base Rod and Gun Club could coordinate for these periodic hunts. Weekend hunts are desirable because of limited aircraft operations, thus, the hunting would have minimum impact on airfield operations.

b. If hunting proves an unsatisfactory method of jackrabbit control, a jackrabbit round-up can be conducted by a Security Police detail and, if needed, volunteers. The round-up would include a line of "chasers" walking the entire length of the airfield, chasing the rabbits ahead of them. A gun team would be stationed at the opposite end of the field to shoot the jackrabbits as they flee the chasers.

c. If these methods are undesirable, Animal Damage Control (ADC) (US Fish and Wildlife Service) personnel may be contacted for further advice. ADC personnel are located in Billings, Montana, telephone 657-6464.

## 6. GROUND SQUIRRELS

A small population of Richardson Ground Squirrels (*Citellus richardsoni*) was observed on the infield area of the airdrome. Like jackrabbits, the ground squirrels are a desired food source for raptors and could increase bird strike potential by attracting raptors to the airfield. Ground squirrel burrows (Figure 2) may also create a hazard to responding emergency vehicles that may have to use the airfield. Ground squirrels may also chew through underground cables, causing airfield facility outages.

### Recommendations

The base is now using strychnine oats and carbon monoxide to reduce ground squirrel populations. These forms of control should be continued. Large burrows should also be filled in to prevent damage to vehicles.

## 7. STANDING WATER

Two areas holding standing water (Figures 3 and 4), as well as other low areas which hold standing water after heavy rains provide both water and food for many species of wildlife. In addition, the thick stands of cattails supported by these areas provide cover for wildlife and restrict drainage.

### Recommendations

a. The area of standing water at the North end of the airfield (Figure 3) is apparently caused by a leaking underground water line which should be repaired.

b. The two low areas on the south end of the airfield which hold moisture and contain thick stands of cattails (Figure 3) should be filled or leveled. This would allow runoff water to spread over a larger area for faster evaporation or absorption. In addition, once the areas are dry, they can be mowed, making the airfield ecology more uniform and less attractive to wildlife.

c. The area of standing water between the abandoned runways should also be filled and tall vegetation cut to discourage use by wildlife.



Figure 2. Ground Squirrel Burrow

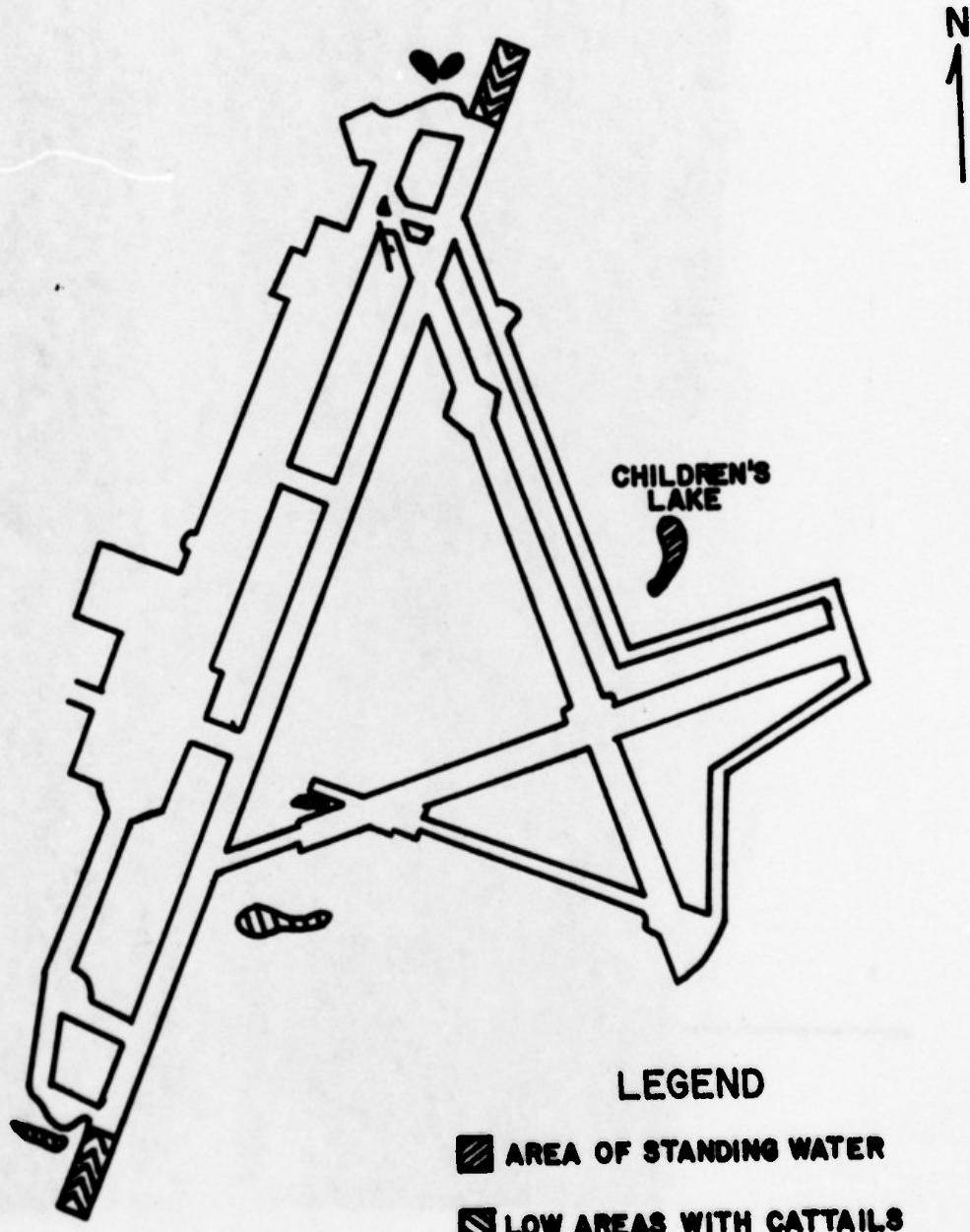


Figure 3. Low Wet Areas on Malmstrom AFB



Figure 4. Standing Water at Malmstrom AFB

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